

WHAT IS CLAIMED IS:

1. A method of binding a text body to a cover with an adhesive to form a bound document, the method comprising:

applying an adhesive to a contacting surface of a plurality of sheets of the text body on an individual sheet-wise basis; and

adhering the plurality of sheets to the cover on an individual sheet-wise basis by making line contact between the contacting surface and the cover and by curing the adhesive.

2. The method of claim 1, wherein the applied adhesive forms a non-zero contact angle with the contacting surface.

3. The method of claim 2, wherein a viscosity of the adhesive is greater than 1000 centipoises and less than 15,000 centipoises.

4. The method of claim 1, comprising preparing each of the plurality of sheets of the text body along the contacting surface prior to applying the adhesive.

5. The method of claim 4, wherein preparing increases a surface area of the contacting surface, exposes a plurality of base fibers of the sheets, or a combination thereof.

6. The method of claim 1, wherein applying the adhesive includes dispensing the adhesive from a dispenser, the dispenser including a time-pressure system, a piston-valve system, an auger-valve system, or a jetting system.

7. The method of claim 1, wherein applying the adhesive includes dispensing the adhesive from a dispenser including a Micro-Electro-Mechanical System, the adhesive is dispensed as a continuous bead on the contacting surface, and a volume of the continuous bead is less than or equal to three microliters.

8. The method of claim 7, wherein the Micro-Electro-Mechanical System is a thermal ink jet device

9. The method of claim 1, wherein applying the adhesive includes dispensing the adhesive from a dispenser including a Micro-Electro-Mechanical System, the adhesive is dispensed as a plurality of individual sub-beads on the

contacting surface, and a volume of each individual sub-bead is less than or equal to ten nanoliters.

10. The method of claim 9, wherein the Micro-Electro-Mechanical System is a thermal ink jet device.

11. The method of claim 1, wherein the plurality of sheets includes an unfolded sheet and the contacting surface is an edge of the unfolded sheet.

12. The method of claim 11, comprising constraining the sheet to maintain the edge straight.

13. The method of claim 1, wherein the plurality of sheets includes a folded sheet and the contacting surface is a folded edge of the folded sheet.

14. The method of claim 13, comprising constraining the folded sheet to maintain the folded edge straight.

15. The method of claim 1, wherein the contacting surface makes line contact with the cover in an area of a spine of the bound document.

16. The method of claim 1, wherein the adhesive is a hot melt adhesive, a light curable adhesive, a two-part adhesive system or a moisture curable adhesive.

17. The method of claim 1, wherein applying the adhesive places a plurality of nanoliter volume beads on the contacting surface at an application rate of no slower than 1 bead per 100 microseconds.

18. The method of claim 1, wherein the plurality of sheets includes a sheet of 20 lb bond paper, the adhesive is a light curable adhesive having a viscosity of 10,000 to 12,000 centipoises, applying the adhesive dispenses a plurality of individual sub-beads on the contacting surface, a volume of each individual sub-bead is less than or equal to ten nanoliters, and the adhesive cures in less than or equal to 20 seconds to bond the contacting surface to the cover.

19. The method of claim 1, comprising forming the cover around the text body.

20. The method of claim 1, wherein the adhesive has a first surface energy, the contacting surface has a second surface energy, and a difference

between the first surface energy and the second surface energy is from 13 to 25 dynes per cm.

21. The method of claim 1, wherein the plurality of sheets includes a cellulosic sheet having a surface energy of 30 to 37 dynes per cm, the adhesive is a light curable adhesive having a surface energy of 50 to 55 dynes per cm, applying the adhesive dispenses a plurality of individual sub-beads on the contacting surface, a volume of each individual sub-bead is less than or equal to ten nanoliters, and the adhesive cures in less than or equal to 20 seconds to bond the contacting surface to the cover, and

wherein calculations for surface energy follow the method of Owens and Wendt.

22. The method of claim 1, wherein the applied adhesive is a first part of a two-part adhesive system and the method comprises applying a second part of the two-part adhesive system to the cover prior to adhering the plurality of sheets to the cover on an individual sheet-wise basis.

23. The method of claim 22, wherein the applied first part of the two-part adhesive system forms a non-zero contact angle with the contacting surface.

24. The method of claim 23, wherein a viscosity of the first part of the two-part adhesive system is greater than 1000 centipoises and less than 15,000 centipoises.

25. The method of claim 22, comprising preparing each of the plurality of sheets of the text body along the contacting surface prior to applying the first part of the two-part adhesive system.

26. The method of claim 25, wherein preparing increases a surface area of the contacting surface, exposes a plurality of base fibers of the sheets, or a combination thereof.

27. The method of claim 22, wherein applying the first part of the two-part adhesive system includes dispensing the first part of the two-part adhesive system from a dispenser, the dispenser including a time-pressure system, a piston-valve system, an auger-valve system, or a jetting system.

28. The method of claim 22, wherein applying the first part of the two-part adhesive system includes dispensing the first part of the two-part adhesive system from a dispenser including a Micro-Electro-Mechanical System,

the first part of the two-part adhesive system is dispensed as a continuous bead on the contacting surface, and a volume of the continuous bead is less than or equal to three microliters.

29. The method of claim 28, wherein the Micro-Electro-Mechanical System is a thermal ink jet device

30. The method of claim 22, wherein applying the first part of the two-part adhesive system includes dispensing the first part of the two-part adhesive system from a dispenser including a Micro-Electro-Mechanical System, the first part of the two-part adhesive system is dispensed as a plurality of individual sub-beads on the contacting surface, and a volume of each individual sub-bead is less than or equal to ten nanoliters.

31. The method of claim 30, wherein the Micro-Electro-Mechanical System is a thermal ink jet device.

32. The method of claim 22, wherein the plurality of sheets includes an unfolded sheet and the contacting surface is an edge of the unfolded sheet.

33. The method of claim 32, comprising constraining the sheet to maintain the edge straight.

34. The method of claim 22, wherein the plurality of sheets includes a folded sheet and the contacting surface is a folded edge of the folded sheet.

35. The method of claim 34, comprising constraining the folded sheet to maintain the folded edge straight.

36. The method of claim 22, wherein the contacting surface makes line contact with the cover in an area of a spine of the bound document.

37. The method of claim 22, wherein applying the first part of the two-part adhesive system places a plurality of nanoliter volume beads on the contacting surface at an application rate of no slower than 1 bead per 100 microseconds.



38. The method of claim 22, wherein the plurality of sheets includes a sheet of 20 lb bond paper, the first part of the two-part adhesive system has a viscosity of 10,000 to 12,000 centipoises, applying the first part of the two-part adhesive system dispenses a plurality of individual sub-beads on the contacting surface, a volume of each individual sub-bead is less than or equal to ten nanoliters, and the two-part adhesive system cures in less than or equal to 20 seconds to bond the contacting surface to the cover.

39. The method of claim 22, comprising forming the cover around the text body.

40. The method of claim 22, wherein the first part of the two-part adhesive system has a first surface energy, the contacting surface has a second surface energy, and a difference between the first surface energy and the second surface energy is from 13 to 25 dynes per cm.

41. The method of claim 22, wherein the plurality of sheets includes a cellulosic sheet having a surface energy of 30 to 37 dynes per cm, the first part of the two-part adhesive system is a portion of a light curable adhesive system having a surface energy of 50 to 55 dynes per cm, applying the first part of the two-part adhesive system dispenses a plurality of individual sub-beads on the contacting surface, a volume of each individual sub-bead is less than or equal to ten nanoliters, and the light curable adhesive system cures in less than or equal to 20 seconds to bond the contacting surface to the cover, and

wherein calculations for surface energy follow the method of Owens and Wendt.

42. A method of binding a text body to a cover with an adhesive to form a bound document, the method comprising:

positioning each of a plurality of sheets of the text body in a stand-off position from the cover on an individual sheet-wise basis, the stand-off position forming a gap between the contacting surface and the cover;

applying an adhesive into the gap on an individual sheet-wise basis, the adhesive contacting both the contacting surface and the cover; and

curing the adhesive to adhere the sheet to the cover.

43. The method of claim 42, wherein the applied adhesive forms a non-zero contact angle with the contacting surface.

44. The method of claim 43, wherein a viscosity of the adhesive is greater than 1000 centipoises and less than 15,000 centipoises.

45. The method of claim 42, comprising preparing each of the plurality of sheets of the text body along the contacting surface prior to applying the adhesive.

46. The method of claim 45, wherein preparing increases a surface area of the contacting surface, exposes a plurality of base fibers of the sheets, or a combination thereof.

47. The method of claim 42, wherein applying the adhesive includes dispensing the adhesive from a dispenser, the dispenser including a time-pressure system, a piston-valve system, an auger-valve system, or a jetting system.

48. The method of claim 42, wherein applying the adhesive includes dispensing the adhesive from a dispenser including a Micro-Electro-Mechanical

System, the adhesive is dispensed as a continuous bead on the contacting surface, and a volume of the continuous bead is less than or equal to three microliters.

49. The method of claim 48, wherein the Micro-Electro-Mechanical System is a thermal ink jet device

50. The method of claim 42, wherein applying the adhesive includes dispensing the adhesive from a dispenser including a Micro-Electro-Mechanical System, the adhesive is dispensed as a plurality of individual sub-beads on the contacting surface, and a volume of each individual sub-bead is less than or equal to ten nanoliters.

51. The method of claim 50, wherein the Micro-Electro-Mechanical System is a thermal ink jet device.

52. The method of claim 42, wherein the plurality of sheets includes an unfolded sheet and the contacting surface is an edge of the unfolded sheet.

53. The method of claim 42, comprising constraining the sheet to maintain the edge straight.

54. The method of claim 42, wherein the plurality of sheets includes a folded sheet and the contacting surface is a folded edge of the folded sheet.

55. The method of claim 54, comprising constraining the folded sheet to maintain the folded edge straight.

56. The method of claim 42, wherein the contacting surface makes line contact with the cover in an area of a spine of the bound document.

57. The method of claim 42, wherein the adhesive is a hot melt adhesive, a light curable adhesive, a two-part adhesive system or a moisture curable adhesive.

58. The method of claim 42, wherein applying the adhesive places a plurality of nanoliter volume beads on the contacting surface at an application rate of no slower than 1 bead per 100 microseconds.

59. The method of claim 42, wherein the plurality of sheets includes a sheet of 20 lb bond paper, the adhesive is a light curable adhesive having a viscosity of 10,000 to 12,000 centipoises, applying the adhesive dispenses a plurality of individual sub-beads on the contacting surface, and a volume of each individual sub-bead is less than or equal to ten nanoliters, and the adhesive cures in less than or equal to 20 seconds to bond the contacting surface to the cover.

60. The method of claim 42, comprising forming the cover around the text body.

61. The method of claim 42, wherein the adhesive has a first surface energy, the contacting surface has a second surface energy, and a difference between the first surface energy and the second surface energy is from 13 to 25 dynes per cm.

62. The method of claim 42, wherein the plurality of sheets includes a cellulosic sheet having a surface energy of 30 to 37 dynes per cm, the adhesive is a light curable adhesive having a surface energy of 50 to 55 dynes per cm, applying the adhesive dispenses a plurality of individual sub-beads on the contacting surface, and a volume of each individual sub-bead is less than or equal to ten nanoliters, and the adhesive cures in less than or equal to 20 seconds to bond the contacting surface to the cover, and

wherein calculations for surface energy follow the method of Owens and Wendt.

63. A system for binding a text body to a cover with an adhesive to form a bound document, the system comprising:

means for applying an adhesive to a contacting surface of a plurality of sheets of the text body on an individual sheet-by-sheet basis; and

means for relative motion between the individual sheets of the text body and the cover to make line contact between the contacting surface and the cover.

64. The system of claim 63, wherein means for applying includes a dispenser containing a time-pressure system, a piston-valve system, an auger-valve system, or a jetting system.

65. The system of claim 63, wherein means for applying includes a dispenser containing a Micro-Electro-Mechanical System.

66. The system of claim 63, wherein means for applying dispenses a plurality of individual sub-beads of the adhesive on the contacting surface and a volume of each individual sub-bead is less than or equal to ten nanoliters.

67. The system of claim 63, wherein the adhesive has a first surface energy, the contacting surface has a second surface energy, and a difference between the first surface energy and the second surface energy is from 13 to 25 dynes per cm.

68. The system of claim 63, wherein means for relative motion includes a clamping device holding the individual sheets in contacting alignment with the cover, wherein the clamping device is mounted for translation on a support.



69. The system of claim 68, wherein the support is a rail and means for relative motion further includes a source of motive force for translating the clamping device.

70. The system of claim 63, comprising means for curing the adhesive to adhere the individual sheet of the text body to the cover.

71. The system of claim 70, wherein means for curing is a radiation source, a heat source or a heat sink.